

AMENDMENTS TO THE CLAIMS

Pursuant to 37 C.F.R. § 1.121, the following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently amended) A BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of an RF power amplifier, comprising:

(1) Determining structural parameters of a neural network as required and establishing the neural network, inputting modeling data and initial values of network parameters required for establishing ~~the a~~ a neural network model of the RF power amplifier;

(2) Propagating forward with the input data and network parameters, calculating the difference between an output value of the neural network and ~~the an~~ expected output value, then propagating backward along the neural network with said difference to correct the network parameters;

(3) Determining whether said difference meets ~~the a~~ a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2);

(4) Solving ~~the a~~ a pre-distortion algorithm of the RF power amplifier with said neural network model;

(5) Carrying out pre-distortion processing for an input signal of the RF power amplifier with said pre-distortion algorithm and then feeding ~~them~~ the processed input signal to the RF power amplifier.

2. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 1, wherein

said structural parameters comprise: ~~the a~~ a number n of delay items of input signal, ~~the a~~ a number r of neural elements on each layer of the neural network, ~~the a~~ a number m of layers of the neural network;

said modeling data comprises: output signal Y(KT), input signal, and delay items of

input signal of the power amplifier;

said network parameters comprise: weight W_{ijk} and bias b_{ij} ;

said output signal $Y(KT)$ of the RF power amplifier is the expected output value corresponding to the input signal, ~~i.e., the actual output value of the RF power amplifier corresponding to the input signal.~~

3. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of the input signal are base-band digital signal amplitude $X(KT)$ of the power amplifier and delay items thereof $X[(K-1)T] \dots X[(K-n+1)T]$, respectively.

4. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 3, wherein the number n of delay items of input signal is: $1 \leq n \leq 10$, the number r of neural elements on each layer of the neural network is: $1 \leq r \leq 10$, the number m of layers of the neural network is: $1 \leq m \leq 10$.

5. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of input signal are base-band digital signal amplitude $X(KT)$ of the power amplifier and delay items thereof $X[(K-1)T]$, $X[(K-2)T]$, ..., $X[(K-n+1)T]$ as well as phase $\Phi_{in}(KT)$ of the base-band digital signal and delay items thereof $\Phi_{in}[(K-1)T]$, $\Phi_{in}[(K-2)T]$, ..., $\Phi_{in}[(K-n+1)T]$; the number of delay items of the input signal comprises the number n_1 of delay items of base-band digital signal amplitude and the number n_2 of delay items of base-band digital signal phase.

6. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 5, wherein the number n_1 of delay items of the base-band digital signal amplitude is: $1 \leq n_1 \leq 5$, the number n_2 of the delay items of base-band digital signal phase is: $1 \leq n_2 \leq 10$, the number r of neural elements on each layer of the

neural network is: $1 \leq r \leq 10$, the number m of layers of the neural network is: $1 \leq m \leq 10$.

7. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said step (2) further comprises:

(71) Calculating ~~the~~ corresponding intermediate variables V_{ij} of the neural network with network parameters W_{ijk} of each layer of the neural network;

(72) Activating ~~the~~ a function to calculate ~~the~~ an output value Y_{ij} of each neural element in the corresponding neural network through the intermediate variables V_{ij} and the neural elements;

(73) Magnifying the output value of the neural elements on ~~the~~ a last layer of the neural network for m times to obtain ~~the~~ an output value $Y_m(KT)$ of the neural network, herein the value of M being higher than the saturation level of the RF power amplifier;

(74) Calculating the difference between $Y_m(KT)$ and actual output $Y(KT)$ of the RF power amplifier;

(75) Magnifying the difference $e(kT)$ between $Y_m(KT)$ and $Y(KT)$ for $-m$ times and calculating $\Omega(V_{ij})$ with output value V_{ij} of the neural elements on the last layer of the network, herein, $\Omega(v) = d\Psi(v)/dv$;

(76) Multiplying $Me(kT)$ with $\Omega(V_{ij})$ to obtain δ_{ij} ;

(77) Propagating δ_{ij} backward along the network channel, in which propagating forward is carried out, with current values of network parameters and obtaining the intermediate variables ui_1, ui_2, \dots, uir ;

(78) Calculating intermediate variables $\delta i_1, \delta i_2, \dots, \delta ir$ with ui_1, ui_2, \dots, uir and current network parameters;

Herein, $\delta i_1, \delta i_2, \dots, \delta ir$ are obtained through multiplying $\Omega(Vi_1), \Omega(Vi_2), \dots, \Omega(Vir)$ with ui_1, ui_2, \dots, uir respectively, said $\Omega(Vi_1), \Omega(Vi_2), \dots, \Omega(Vir)$ are calculated out with intermediate variable vi_1, vi_2, \dots, vir ;

(79) Updating current network parameters with $\delta i_1, \delta i_2, \dots, \delta ir$, and calculating c with the following equation: $c = [\sum (\delta i_1^2 + \delta i_2^2 + \dots + \delta ir^2) + \delta ij^2]^{1/2}$;

Wherein when updating the current network parameters, the updated network parameters W_{ijk} and b_{ij} are calculated out as follows:

W_{ijk} = value of network parameter before update - $\eta \times \delta_{ij}$ \times output value of corresponding neural elements, herein η is the searching step length;

b_{ij} = value of network parameter before update - $\eta \times \delta_{ij}$.

8. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said step (3) comprises: determining whether c meets the criterion; if so, outputting the neural network model of the RF power amplifier, otherwise inputting the corrected network parameters W_{ijk} and b_{ij} to the neural network and going to step (71).

9. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said $K = 2 \times \text{mean gain } k_b$ of RF power amplifier.

10. (Currently Amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein ~~the~~ a bandwidth of said input signal is wider than that of actual input signal of RF power amplifier.